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CULTURAL STUDIES ON TOMATOES FOR PROCESSING

1977

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1977 RESEARCH REPORT ON TOMATOES FOR PROCESSING

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Studies on culture and physiology of tomatoes for processing were conducted at 3 locations of OARDC--Main Campus, Wooster; Green Springs Crops Research Unit, Green Springs; and the Northwestern Branch, Custar.

Research on the Wooster campus is usually of the preliminary nature and requires frequent observation and data collection. The soil is a Wooster silt-loam with good uniformity throughout the plot area. The plots received 800 lb/A of 10-20-20 fertilizer after plowing, but before final discing and fitting for planting. No additional fertilizer was applied. Diphenamid and chloramben were used for weed control according to standard recommendations. Other pesticides were applied according to recommended practice. No serious problems with weeds, insects or diseases occurred. Soil moisture was less than desirable during plant recovery following transplanting and the plots were irrigated with about 2 in. of well water immediately after planting. Rainfall and temperature data are summarized in Table 1.

Soil at the Green Springs Unit is a fine sandy loam and also uniform throughout the experimental area. Except where fertilizer nutrients were under study, 800 lb/A of 6-24-24 was applied pre-plant broadcast. Herbicide, insecticide and fungicide materials and applications were similar to the Wooster studies and according to recommended procedures. Rainfall was generally adequate at this location (Table 1). No serious weed and insect problems occurred but fruit rots near harvest were serious due to the excessive vine growth and moisture in late August and September. This generally necessitated harvesting the plots before the most desirable time when the maximum amount of fruit ripening had occurred. Nevertheless, yields were good and the data appear reliable.

Soils at the Northwestern Branch are classed as Hoytville clay and reasonably uniform, although some variation is present. All plots were bedded in the fall using a power bedder. Beds were on 60 in. centers with 48 in. top and furrows 6-8 in. deep. Prior to planting in the spring, the beds were very lightly worked (1" deep) and re-shaped with the power bedder, unless tillage was part of the study. P and K were applied in the fall at a rate of 1200 lb/A as 0-26-26 after plowing but prior to bed formation. N was broadcast at a rate of 70 lb/A of N in the spring prior to bed re-shaping except in plots where N was under study. Rainfall was very light early in the season (Table 1) and it was necessary to irrigate on June 22 with 3/4 in. of water. Pesticide programs were according to recommended practice and were very adequate as no serious weed, insect or disease problem occurred throughout the season.

WOOSTER STUDIES

-Protecting Plants from Ozone Injury with DPX 4891-

Transplants of Campbell 37 were field set on May 20, 1978, in 5 ft. rows with 12 in. between plants. DPX 4891, an experimental chemical which has shown effectiveness in protecting plants from ozone injury in other areas, was applied as an aqueous spray at active ingredient rates of 0.5 and 1.0 lb. in 60 gal. of

water/A weekly starting on June 15 and continuing until August 11. Tween 20 was added to make up a 0.1% conc. as a wetting agent. Treatments were replicated 4 times in 20 ft. rows.

Observations were made on any observable differences in foliage color, growth, injury, etc. between treated and non-treated plants. Fruits were harvested once on August 30 and yield data taken as tons/Acre marketable, green or rotted. Yield results given in Table 2, indicate the treatments had no influence on yield. No classical ozone foliage injury symptoms nor any other type of injury to the plants were found on untreated or on treated plots throughout the season. However, treated plants appeared to grow somewhat longer after maximum fruit set but yield data suggest that no additional fruits were set which would be undesirable, especially for machine harvest operations.

Plants at the Northwestern Branch were also treated for observational purposes only and no differences in the appearance between treated and non-treated plants were apparent throughout the season.

Ozone apparently was not a serious problem in these two locations in Ohio in 1977. However, it is suspected of causing injury during some years and work with DPX 4891 or some similar protectant is worthy of continuation. It appears that this chemical is not phytotoxic at the rates used and thus would not be expected to cause problems from this standpoint in the future.

-Influence of Experimental Chemical A 497 on Fruit Size and Yield-

Transplants of Chico III and Campbell 37 were field set on May 20, 1977, on 5 ft. rows with 12 in. between plants. Rates of A 497 were 0.5, 1.0 and 1.5 lb. active in 60 gal. water/A applied at 2 stages of fruit development--when early clusters were set but later blossoms were still setting fruit and when fruits on the last clusters to set were an estimated one-half of their final size. The first treatments on Chico III were applied on July 14 near 10:00 A.M. under sunny skies with temp. of 75°F. The other treatment on Chico III and the initial treatment on C-37 plants was on June 26 10:00 A.M. with partly cloudy skies and 66°F. The second treatment stage for treatment on C-37 was on August 4, near 10:00 A.M. under sunny conditions and 78°F. The Chico III plots were harvested on August 24 and C-37 on August 30, as a single destructive harvest. Fruit size measurements were made for comparison as well as total yield of ripe, green and rotted fruit.

No differences in treatment effects on plant growth and development were observable throughout the season. This was similar to results of 1976 when the initial studies with this chemical were done. Also, no differences in fruit size were found on the harvested fruit of either variety which was also similar 1976 results. Yield data (Table 3) indicate that the chemical applied early in fruit development significantly reduced yield of marketable fruit and total yield at all rates. Further, the 1.5 lb/A rate significantly reduced total yield at both times of application. Both varieties responded similarly to the chemical treatments. Although this chemical has greatly increased tomato fruit size in other studies, it appears that this chemical does not increase fruit size and consequently yield of the processing tomato varieties Chico III and C-37 under the conditions of this study.

TABLE 1.--Available Temperature and Rainfall Data.

	Temperature		Rainfall (in.)	
	1977	20-Year Avg.	1977	20-Year Avg.
		Northwestern Branch		
April	52.1	49.5	3.62	3.08
May	64.5	60.2	2.38	3.26
June	66.5	69.3	2.18	3.52
July	73.8	72.3	5.88	4.11
August	68.9	70.4	3.84	2.98
September	64.6	64.3	5.20	3.16
		Wooster Campus		
April	51.1	48.1	3.93	3.14
May	63.4	58.4	1.47	3.84
June	63.9	67.5	4.13	3.87
July	72.4	71.4	7.82	4.02
August	69.2	69.7	5.42	3.51
September	64.9	63.4	5.59	3.08
		Green Springs Unit	Rainfall-1977	
April			3.77	
May			2.09	
June			5.44	
July			3.34	
August			4.46	
September			3.71	

TABLE 2.--influence of DPX 4891 on Yield of C-37 Tomatoes, Wooster, 1977.

Treatment	Marketable T/A	Marketable %	Green T/A	Green %	Rotted T/A	Rotted %	Total T/A
Check	34.07	66.7	14.70	28.8	2.28	4.4	51.05
0.5 lb/A weekly	35.52	70.8	12.08	24.1	2.46	4.9	50.06
1.0 lb/A weekly	30.96	67.0	13.20	28.3	2.12	4.6	46.28
	No significant difference between treatment means						

TABLE 3.--Influence of A 497 on Yield of Tomatoes, Wooster, 1977

Treatment	Fruit Development When Treated	Marketable T/A	Marketable %	Green T/A	Green %	Rotted T/A	Rotted %	Total T/A
Check		31.57	64.7	15.41	31.6	1.76	3.6	48.74
0.5 lb/A	Early clusters half final size	27.93	62.2	14.56	32.4	2.41	5.3	44.90
0.5 lb/A	All set; late fruit half final size	32.55	67.5	13.59	28.6	1.86	3.9	48.00
1.0 lb/A	Early clusters half final size	28.01	66.1	12.32	29.5	1.82	4.3	42.15
1.0 lb/A	All set; late fruit half final size	32.33	68.4	12.55	27.0	2.16	4.5	47.04
1.5 lb/A	Early clusters half final size	28.67	68.2	11.08	27.1	1.96	4.6	41.71
1.5 lb/A	All set; late fruit half final size	31.41	70.1	11.06	24.9	2.20	4.9	44.67
	LSD .05 =	2.83	NS	2.87	NS	NS	NS	3.39

-Damping-Off of Field Seeded Tomatoes-

A study was conducted with the cooperation of Drs. Harry Hoitink and Gil Daft of the OARDC Department of Plant Pathology to determine the effectiveness of certain treatments on controlling damping-off in field seeded tomatoes. Preliminary greenhouse studies indicated that composted hardwood bark contains inhibitors which reduce activity of damping-off organisms. With recent developments in plug-mix seeding and from our recent studies with the use of composted bark, it was felt that this bark mix should be investigated more fully on its effects on damping-off of young seedlings.

Treatments included seed treated and not treated with thiram in "Choice 7030" composted bark mix or "Jiffy Plus", as plug-mix seedings, and a check treatment of the use of the John Deere 33 vegetable seeder with vermiculite as an anti-crustant. This study was conducted at the Wooster campus and at the Green Springs Unit. The plots were irrigated several times at each location to try to induce seedling infection. Pathologists made regular counts on seedling emergence and disease incidence.

Results revealed that the incidence of disease was nearly zero in spite of the several irrigations and the only positive response was a slightly higher number of seedlings emerged using the composted hardwood bark mix. Efforts will continue in this area of study.

NORTHWESTERN BRANCH STUDIES

-Nitrogen Source and Method of Application on Fall Beds-

Incorporating nitrogen fertilizers is usually a desirable practice to prevent loss due to surface erosion and volatilization. However, fall-prepared beds should be worked only a very minimum prior to planting in most northwestern Ohio soils. This study was designed to examine various nitrogen sources using 3 methods of application for fall bedded tomatoes.

Nitrogen sources were ammonium nitrate, urea, liquid N (28%), and calcium nitrate. All were applied at the rate of 80 lb/A of N except for the check treatment which received no N. The methods of application were, 1) broadcast on top of bed with no incorporation; 2) broadcast on top of bed and incorporated 1 in. deep with rotary tiller of the power bedder; 3) chisel 2 in. deep, 10 in. each side of the row. The applications of N were made the same day of planting. Transplants of Campbell-37 were obtained from Campbell Soup Co. and planted on May 17, 1977, using a commercial transplanter which also applied a starter solution which contained a small amount of N plus higher amounts of P and K. Harvesting was done with an FMC harvester on September 6, 1977.

No great differences in plant growth and development were apparent during the growing season except that plants in the check plots were very slightly smaller and a lighter green color than the other plants. Further, fruit maturity and plant senescence did not appear to be greatly influenced by fertilizer treatment. Data in Table 4 indicate that the field observation on maturity effects were indeed the case.

TABLE 4.--Influence of Source of Nitrogen and Method of Application on Yield of Processing Tomatoes; Northwestern Branch, 1977.

Treatment	Marketable T/A	Marketable %	Green T/A	Green %	Rotted T/A	Rotted %	Total T/A
Check - 0 Nitrogen	18.00	75.1	4.10	17.4	1.53	6.5	23.63
Am.Nitrate-Top only	24.30	78.4	5.15	16.3	1.58	5.0	31.03
-Top + Rotary Till 1" deep	24.41	78.0	5.35	17.3	1.18	3.8	30.94
-Chisel 2" deep	24.39	81.0	4.42	14.7	1.29	4.2	30.10
Urea-Top only	20.80	76.5	5.13	18.7	1.35	4.7	27.28
-Top + Rotavate 1"deep	23.93	79.0	5.41	17.5	1.05	3.4	30.39
-Chisel 2" deep	22.05	79.7	4.47	16.2	1.12	4.1	27.64
28% Liquid N-Top only	21.10	74.6	6.22	22.1	0.91	3.2	28.23
-Top + Rotary Till 1" deep	24.08	80.5	4.61	15.5	1.20	4.0	29.89
- Chisel 2" deep	22.72	75.5	5.57	18.6	1.72	5.9	30.01
Cal.Nitrate-Top only	22.01	74.5	6.45	21.8	1.07	3.6	29.53
-Top + Rotary Till 1" deep	22.46	77.6	5.01	17.5	1.34	4.9	28.81
-Chisel 2" deep	22.58	79.1	4.48	15.8	1.46	5.1	28.52
LSD .05 =	3.44	NS	NS	NS	NS	NS	3.32

Yield results (Table 4) indicate all treatments except the top, non-incorporated applications of Urea and Liquid N (28%0 had significantly greater yields marketable ripe fruits than the check treatment. Further, the top, non-incorporated application of Urea had a significantly lower yield of marketable, ripe fruits than all of the ammonium nitrate treatments.

Drawing firm conclusions from this single seasons' trial would be hazardous because of the below normal rainfall early in the growing season and above normal late and the influence of water on the availability of fertilizer nutrients. Nevertheless, it appears that Urea and Liquid N (28%) should probably not be surface applied without incorporation on fall beds for processing tomatoes in northwestern Ohio.

-Storage of Pre-Germinated Seeds for Plug Mix Seeding-

Pre-germinating seeds used with the Plug-Mix seeding method has shortened emergence time by several days and is usually a desirable practice. However, what does one do with the pre-germinated seedlings if adverse weather precludes planting on schedule? This study was a continuation of previous studies on storage of pre-germinated seed which indicated that seed germinated at 80°F for 48 hours in moist vermiculite could be kept for up to 6 days with a somewhat delaying effect on emergence but no serious reduction in yield. Longer storage of up to 10 days had a greater delaying effect on emergence but also did not seriously reduce yield.

Campbell 37 was the variety used in this study. Treatments were: 1) no pre-germination; 2) pre-germinated but no storage; 3) pre-germinated and stored for 4 days; 4) pre-germinated and stored for 8 days. Germinating conditions were in trays of moist vermiculite at 80°F for 48 hours. For storage, the seedling-vermiculite mixtures were kept in the trays and placed in plastic bags to prevent dehydration and placed in 40°F refrigerated rooms for the indicated number of days. On the day of planting the correct amounts of seed or seedling-vermiculite mix to give 14.2 gms per bushel of mix, were mixed with the commercial "Jiffy Plus" mix or "Choice 7030" Nursery mix which contains composted hardwood bark plus vermiculite and peat to which Mag-Amp had been added to give a mixture similar to Jiffy Plus. Additional treatments of No. 4 vermiculite with and without pre-germinated seeds; John Deere 33 vegetable seeder plus vermiculite anti-crustant; and transplants were included as controls for comparisons in the study. The plug mix seeder was set to deliver 1/4 cup of mix per hill spaced 11 in. between drops. The John Deere vegetable seeder was set to clump plant at similar spacing. All plots received 70 lb/A of N pre-plant and tilled in 1 in. deep.

Stand counts were made on 2 dates because of very uneven emergence (Table 5). Rainfall from seeding on May 10 to the end of May amounted to 0.28 in. which was insufficient to provide enough moisture for good germination. More rain occurred in early June and additional emergence resulted. Nevertheless, the emergence data confirm our previous suspicions that storage of pre-germinated seed at 40°F for a period more than 5 or 6 days results in reduced emergence and should be avoided. Work in controlled temperature chambers on storage at higher temperatures has indicated that a temperature near 40°F is necessary to nearly stop seedling growth after germination.

Emergence data also reveal that pre-germination aids greatly in early emergence. The improved emergence with the Bark-mix may have been the result of a higher moisture level in the bark mix at planting as compared to the Jiffy Plus. This could also be the cause of the higher early emergence with the #4 vermiculite plug-mix seeding and the John Deere seeder plus vermiculite anti-crustant. Vermiculite has a great capacity to absorb and hold water and it is quite likely that the 0.23 in. of rainfall which occurred on May 18 was absorbed by the vermiculite and it was sufficient to promote early emergence. Jiffy Plus and the Bark mix contain peat moss and other organic matter and very small amounts of vermiculite. The organic materials are very difficult to wet after they dry and it is reasonable to assume that the 0.23 in. of rainfall was insufficient to wet the plug well to aid emergence.

Yield results (Table 5) conform to the delayed emergence effects and the storage treatment responses. In reviewing the data, keep in mind that the plots were harvested by machine as a once-over harvest, all on the same date, September 6, 1977.

-Ethephon -"Sweep" Studies-

A study was conducted to evaluate the use of "Sweep", an experimental ethephon activator and perhaps safener, on tomatoes to reduce the effect of ethephon causing excessive leaf senescence. Ethephon rates were 0, 2.0 and 3.25 pints per acre. Sweep was used at 0, 0.25, 0.5 and 1.0 pints per acre. Transplants of Campbell 37 were used.

Results revealed that "Sweep" had no apparent effect on improving the effectiveness of the recommended rate (3.25 pts/A) or the reduced rate (2.0 pts/A) of ethephon for the initiation of fruit ripening. Further, it also had no consistent, significant influence on reducing the yellowing of foliage as the result of using ethephon for ripening.

TABLE 5.--Relation of Pre-germination and Storage on Stand Establishment and Yield of Plug-Mix Seeded Tomatoes, Northwest Branch, 1977.[1]

Treatment	No. of Hills/Row 6/16	No. of Hills/Row 7/19	Single Harvest Yield: Marketable T/A	Marketable %	Green T/A	Green %	Rotted T/A	Rotted %	Total T/A
Jiffy Plus, No Pre-germ	9.0	17.0	10.80	52.8	9.50	46.5	.14	0.7	20.44
, Pre-germ, 0 storage	12.5	17.2	14.60	65.8	6.30	31.9	.53	2.3	21.43
, Pre-germ, 4 days storage	13.0	13.7	15.53	69.2	6.27	28.6	.46	2.1	22.26
, Pre-germ, 8 days storage	10.0	14.5	10.61	56.2	7.75	42.3	.28	1.5	18.64
Bark Mix, No Pre-germ	7.7	25.2	11.19	52.7	9.87	46.1	.25	1.2	21.31
, Pre-germ, 0 storage	17.2	21.5	16.78	67.9	7.36	29.7	.58	2.3	24.72
, Pre-germ, 4 days storage	15.7	19.7	16.27	68.2	7.02	29.5	.56	2.3	23.85
, Pre-germ, 8 days storage	10.2	16.2	12.23	55.6	9.32	42.6	.40	1.7	21.95
#4 Vermiculite, No Pre-germ	22.7	24.5	16.69	67,8	7.07	29.3	.70	2.8	24.46
, Pre-germ, 0 storage	23.2	26.2	19.53	80.3	3.90	16.2	.84	3.4	24.27
John Deere Seeder & Vermiculite	19.7	27.7	13.01	60.2	7.51	37.8	.42	1.9	20.94
Transplants	30.7	30.7	21.04	83.6	3.08	12.3	1.02	4.0	25.14
LSD .05 =	Z	Z	4.61	12.8	2.44	13.8	.39	1.5	3.86

1 Field seeded on May 10; transplants set on May 13, Plug-mix planter mfgr. Mechanical Transplanter Co., Holland, MI. used for all treatments except John Deere seeder and transplants.

Z Data not statistically analyzed at writing this report. The miximum number of hills in all plots except the transplants would have been 33.

GREEN SPRINGS STUDIES

-Multiple Plants Per Hill with Transplants-

Future developments with tomato transplants will likely include an automated, mechanical planter. It is not likely that it will plant single plants as is now done by hand labor. No information is available on multiple plants per hill with transplants. The number of plants per hill of field seeded tomatoes does not have any apparent effects on maturity nor yield although fruit size may be affected.

Field studies were conducted 1976 and 1977 to determine the effects of multiple transplants on yield and production problems in anticipation of mechanization of transplanting. Plants of Campbell 28 were obtained from a commercial source and transplanted with a mechanical planter. Numbers per hill were 1, 3 and 6 plants with hills on 12 in. spacings in rows 5 ft. apart. Fertilization, pest control and other cultural practices were uniform for the studies. The fruits were harvested by hand as a single destructive harvest on September 7 in 1976 and 1977.

Results summarized in Table 6 indicate the variation in responses that frequently occur with field studies where environmental conditions vary. Lower yield in 1976 with higher numbers of plants per hill was primarily due to a delay in maturity and some due to increased amounts of rotten fruit. In 1977, there was excessive variability in results due primarily to the lack of a uniform stand due to dry, warm weather for over two weeks following transplanting. There were numerous plants in some of the plots with 3 or 6 plants per hill which died after planting with fewer in the single plant rows. There also were serious problems with fruit rots which necessitated harvest before a more desirable 70-80% usable fruit range was attained. Nevertheless, the 1977 results illustrate some problems which may be expected from multiple plant transplanting: 1) Control of fruit disease organisms will likely be more troublesome; 2) Stand establishment with multiple plants may be more difficult under adverse weather conditions; 3) Maturity may be somewhat delayed with more than 1 plant per hill.

It appears that single plants are the more desirable for transplanted tomatoes and hopefully, mechanical transplanters, when they become available, will have the capacity for singulation or nearly so when planting.

-Growth Regulator Treated Transplants-

Efforts to improve quality of transplants from Georgia have led to cooperative studies with several researchers in Georgia and other states. Initial studies here in Ohio and by other persons revealed that ethephon (Ethrel) was effective in removal of flowers from tomatoes and should be evaluated for removal of the generally undesirable first flower cluster of processing tomatoes. SADH (Alar) is used by floriculturists and bedding plant growers to prevent excessive growth of vegetable and flower transplants. It may have a possible use in plant production to reduce the frequency of or eliminate the need for clipping of transplants to control size and improve uniformity.

Several years of field and greenhouse experiments have been devoted to the study to determine if and where these chemicals fit into the plant production program and to develop the best procedure for their use. Several previous reports of progress have been published and this report will summarize some of the latest results and what may be the final field experiments in this current program.

During the 1976 season, seedlings of Chico III were treated in Georgia at a rate of 1 pt. of Ethrel in 100 gal. of water per acre. Treatments were made when flower buds of the first cluster were visible but before flowers were open. The treated plants along with some untreated control plants were then harvested and shipped to cooperators in Ohio and Indiana. The plants were divided into 2 additional lots for treatment with ethephon for fruit ripening in the fall, thus giving a total of 4 treatments.

Results at the Green Springs location were typical of other locations and were as follows:

	Ripe	
Treatment	T/A	%
Control-No Treatment	27.25	63.0
Treated in Ga. Only	33.16	71.5
Treated in Ga & for Ripening	39.17	91.8
Treated for Ripening only	34.72	84.9
LSD .05 =	3.04	4.4

There is little doubt that ethephon-treated plants had higher yields and generally earlier, more concentrated maturity when planted in Ohio and Indiana. Additional data and observations revealed that treated plants become established more rapidly in the field following transplanting than untreated plants. This is likely related to increased dry matter content in treated plants and some other unknown factors related to greatly increased root regeneration of treated plants. This rapid plant recovery cannot be completely related to the absence of flowers and/or fruit on the first cluster.

The response after transplanting of plants treated with SADH has been more variable than that of plants treated with ethephon. SADH apparently can reduce growth sufficiently in the plant beds to significantly reduce the number of clippings in Georgia but occasionally regrowth following planting in the north has been delayed. A study was conducted in 1977 to determine if the frequency of SADH treatments or the time of treatment prior to pulling the plants or if the combination of SADH and ethephon caused the variability in response.

Results (Table 7) suggest that indeed, if applications of SADH are made too close to pulling, yields may be reduced and regrowth data (not presented) indicate that these late applications significantly reduce plant growth compared to untreated or ethephon only treated plants. Further, regrowth data as well as the yield data in Table 7 suggest that ethephon treatment tends to reduce the regrowth delay resulting from SADH treatment at any time prior to pulling.

Another study involved multiple application of SADH which may be necessary to eliminate clipping of plants in Georgia. Plants were seeded in Georgia on March 18 and treated with 5 lb/A of SADH (Alar) plus 1 pt. of ethephon (Ethrel) on April 25. Additional treatments of 3 lb/A of Alar were made on May 2 and May 9. Plants were pulled on May 13 and planted at Green Springs on May 16. Plants used as controls were seeded on April 8 and were not treated nor clipped prior to pulling on May 13.

Field observations revealed that the treated plants were delayed in regrowth following transplanting and the effect was visible for nearly 5 weeks after plant-

TABLE 6.--Influence of Number of Transplants Per Hill on Yield of Processing Tomatoes, Green Springs, 1976-77

No. Plants/Hill	Marketable T/A	Marketable %	Green T/A	Green %	Rotted T/A	Rotted %	Total T/A
1976 - 1	40.23	84.7	5.88	12.5	1.31	2.8	47.42
3	39.62	80.2	8.01	16.2	1.80	3.6	49.43
6	37.50	74.4	9.89	19.6	2.99	5.9	50.38
LSD .05 =	NS	3.7	1.70	3.0	0.70	1.6	NS
1977 - 1	26.70	51.4	18.09	36.3	6.13	12.3	50.92
3	16.22	37.6	21.26	50.4	5.12	11.9	42.60
6	15.41	41.1	13.24	36.6	8.41	22.3	37.06
LSD .05 =	NS	NS	NS	NS	2.69	4.6	NS

TABLE 7.--Relation of Time of Treatment with SADH Prior to Pulling Plants and Ethephon Treatment in Georgia to Yield Following Transplanting in Ohio, 1977.

Treatment[a] SADH (lb/A)	Ethephon (pt/A)	Days Prior to Pulling for SADH Appl.	Yield-Ripe T/A	Yield-Ripe %
0	0	--	27.68	57.7
0	1	--	34.67	63.2
5	0	25	31.08	63.9
5	1	25	32.01	61.9
5	0	20	33.04	64.8
5	1	20	31.93	59.6
5	0	15	30.77	61.7
5	1	15	32.31	62.1
5	0	10	32.51	64.5
5	1	10	32.78	68.2
5	0	5	28.62	61.1
5	1	5	34.22	68.8
5	0	Same Day	Plants	Dead
5	1	Same Day	Plants	Dead
		LSD .05 =	4.84	7.3

a Ethephon applied to indicated treatments on April 26 which was 14 days prior to pulling.

ing. Yield of ripe fruit on Aug. 30 from the treated plants was 32.96 T/A while the non-treated plants produced 37.16 T/A which was significantly greater. These results indicate that multiple applications of SADH in Georgia will likely result in delayed regrowth and reduced yield following transplanting in Ohio.

Results from several experiments on the use of ethephon and SADH for tomato transplant production indicate that ethephon used at the rate of 1 pt. of Ethrel in 100 gal. of water per acre applied after first cluster flower buds are visible but before blossoms open is effective in improving plant quality, plant recovery following transplanting, concentrating maturity and improving yields in the northern production areas. The use of SADH appears doubtful at the moment in that it can have a delaying effect on plant regrowth after planting in the north, especially if multiple applications were used or if applied too close to pulling.

-Response of Transplants from Plants Grown from Sized-Seed in Georgia-

Growth chamber studies suggested that larger tomato seeds of a given variety germinated and emerged more rapidly than smaller seeds. A cooperative study was arranged with researchers at Tifton, Georgia to determine if the plants produced from larger seeds would recover more rapidly from transplant shock and produce earlier and/or higher yields than from smaller or unsized seeds.

Seeds of Campbell 37 were initially sized into small, medium and large seed by an air-column seed separator. Then each size subjected to air separation to remove either none, 20% or 40% of the smaller seed in each lot. In addition some non-sized seed had none, 20% or 40% of the smaller seed removed. Plants were grown from these seed lots in plant beds in Georgia and then shipped to Ohio for field planting on May 31, 1977.

No discernible differences between treatments were observed during the growing season. Plants were harvested by hand as a single destructive harvest on September 6. Results revealed that seed sizing had no influence on yields in Ohio (Table 8).

-Relation of Plant Vigor to Effectiveness of Ethephon for Ripening-

Previous studies and grower observations have suggested that plant vigor may influence the degree of ripening which may be initiated by an application of ethephon. A.A. Taha has been investigating this aspect as a part of his research for his Ph.D. dissertation.

Transplants of C-28 were planted on May 13 at the Green Springs Unit and on May 20 at Wooster. Nitrogen fertilizer was used to give differences in vigor. Rates were 0, 100 and 200 lb/A of N applied pre-plant broadcast. Cultural practices during the season were uniform and according to good cultural practices. Ethephon treatments of 0 and 0.8 lb. in 60 gal. of water/A were applied when 15-20% of the fruits on the plants were red or turning.

Results summarized in Table 9 indicate that the nitrogen treatments delayed maturity which was a result of increased vigor and that ethephon significantly increased the amount of ripe fruit at each location. There was no interaction between nitrogen (plant vigor) and ethephon treatments; thus, suggesting that plant

vigor had no influence on effectiveness of ethephon for fruit ripening. However, this conclusion should be considered tentative until all other data concerning this study have been properly analyzed. Future reports will contain additional evidence.

TABLE 8.--Influence of Seed Sizing for Producing Plants in Georgia on Subsequent Production in Ohio, Green Springs 1977.

Initial Sized Seed	Additional Removed (%)	Ripe T/A	Ripe %	Green T/A	Green %	Rotted T/A	Rotted %	Total T/A
Non-Sized	0	36.49	70.4	10.90	20.8	4.54	8.8	51.93
	20	38.88	71.0	12.06	22.0	3.82	6.9	54.76
	40	38.30	71.2	12.39	22.8	3.24	6.0	53.93
Small	0	35.80	66.6	14.26	26.8	3.53	6.6	50.06
	20	34.15	64.7	15.00	28.9	3.41	6.4	52.62
	40	36.33	68.8	13.50	25.4	3.04	5.7	52.87
Medium	0	37.59	69.2	13.07	23.9	3.69	6.8	54.35
	20	38.55	70.8	11.80	22.1	3.82	7.0	54.17
	40	33.65	67.4	13.06	26.1	3.24	6.5	49.95
Large	0	34.91	67.6	12.91	24.8	3.91	7.5	51.73
	20	33.71	69.1	10.43	21.5	4.61	9.4	48.75
	40	37.75	70.1	12.62	23.1	3.65	6.8	54.02
		No Statistically Significant Differences Present						

TABLE 9.--Influence of Nitrogen Fertilization on Effectiveness of Ethephon for Ripening Tomatoes, 1977.

Location	Nitrogen lb/A	Ethephon lb/A	Ripe T/A	Ripe %	Green T/A	Green %
Wooster	0	0	26.4	64.3	11.6	25.2
	0	.8	32.5	82.5	3.6	9.2
	100	0	29.4	63.8	13.7	30.0
	100	.8	33.1	80.2	5.0	12.4
	200	0	26.4	57.3	16.5	35.8
	200	.8	31.7	77.9	6.4	15.9
		LSD .05 =	8.7	9.6	3.0	7.7
Green Springs	0	0	31.0	74.1	6.8	15.8
	0	.8	34.9	82.2	2.6	6.0
	100	0	32.6	71.6	8.0	17.6
	100	.8	32.6	79.0	3.7	9.0
	200	0	28.9	67.0	10.1	23.3
	200	.8	34.9	78.6	4.4	9.9
		LSD .05 =	4.9	8.9	4.0	8.9

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